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FOURTH ANNUAL REPORT

OF THE

South Carolina Experiment Station,

NOW A DEPARTMENT OF

CLEMSON AGRICULTURAL COLLEGE,

FOR THE

Year Ending Dec. 31, 1891.

1892:
SHANNON & Co., Printers,
Greenville, S. C.

BOARD OF TRUSTEES OF CLEMSON AGRICULTURAL
COLLEGE.

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D. K. NORRIS.	J. E. TINDAL.	J. E. BRADLEY.
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STAFF OF STATION.

H. A. STRODE, President and Director.
J. S. NEWMAN, Vice Director, Agriculturist, Horticulturist
and Head of Farm.
J. F. DUGGAR, M. S., Asst. Director.
J. F. C. DUPRE, Asst. Horticulturist.
M. B. HARDIN, Chief Chemist.
R. N. BRACKETT, Ph. D., Chemist.
C. W. SIMS, A. B., Asst. Chemist.
F. S. SHIVER, Ph. G., Asst. Chemist.

Post Office is Fort Hill, Pickens Co., S. C.
Express and Telegraph office is Pendleton, S. C.
Nearest R. R. Station for Freight is Calhoun, S. C.

FORT HILL, S. C., JAN. 18th, 1892.

*To His Excellency, B. R. TILLMAN, Governor of South
Carolina :*

I have the honor to submit, in accordance with the third section of the Act of Congress known as the Hatch Act, the following Annual Report of the South Carolina Experiment Station, located at the Clemson Agricultural College.

H. A. STRODE,

Director.

DIRECTOR'S REPORT.

On November 1, 1890, the Board of Trustees of Clemson Agricultural College, found itself, by operation of a previous Act of the Legislature, charged with the duty of establishing an Agricultural Experiment Station at Fort Hill, S. C., in connection with the Clemson College, to be supported by the funds coming to the State of South Carolina under what is known as the Hatch Act.

The Experimental Stations at Columbia, Darlington and Spartanburg were abolished, and by an Act passed in December following, the property of those stations was ordered to be sold and the proceeds turned over to the Board of Trustees of Clemson College as a building fund. Previous to November 1, 1890, the President of the College was elected Director of the Station, and Mr. J. F. Duggar was elected Assistant Director, and charged more particularly with the field duties of the Station under the special direction of a committee of the Board, of which committee Col. D. K. Norris, of Pendleton, was chosen chairman. The report of the Assistant Director will give in detail the work that was carried on under direction of this Committee.

During the year the work of clearing the farm of 800 acres, turned over to the Station by resolution of Board of Trustees of Clemson College, and the work of erecting all necessary buildings for the Station was pushed rapidly. Only \$750 in one year out of the Hatch Fund could be used on buildings, but the Board of Trustees of the College generously provided funds for erecting a handsome laboratory building, a large stable for work animals, a large barn for cows, with silos and other arrangements; a handsome building for the Station office, with rooms in it, also, for Station library, seed and work rooms; and, in addition, roomy brick residences for the several heads of departments, who generally will also hold some position in the College. For the first year the salaries of the chemists of the Station have not been a charge on the Hatch Fund, as the money was needed for other purposes and the College had an independent fertilizer fund, to which these salaries could be charged. The work for the year of the

chemists, Col. M. B. Hardin, chief chemist, and C. W. Sims and F. S. Shiver, assistants, has appeared in Bulletins Nos. 1 and 3 from this Station.

During the year the Board has elected J. S. Newman to be the Agriculturist, Horticulturist and Vice-Director of the Station. He has accepted the call and will enter upon his duties February 1, 1892. The Board also elected J. F. C. DuPre to be Assistant Horticulturist. Mr. DuPre entered upon his duties January 1, 1892. Unfortunately, the opening of the College, for lack of appropriation asked for from the Legislature, has been postponed beyond the day first set, February 1, 1892, and the Station will be prevented adding other members to its staff for the present.

It should be stated that when the transfer from the Station at Columbia to the Station at Clemson College had to be made, the Director at this Station was directed by the Board of Trustees here to make arrangements with Dr. J. M. McBryde, Director at Columbia, to complete any interrupted experiments of value to the State.

The results of these experiments thus completed, have been published in Bulletin No. 2, from this Station, and full credit given therein to Dr. McBryde.

H. A. STRODE,
Director.

REPORT OF ASSISTANT DIRECTOR.

DIRECTOR H. A. STRODE:

Dear Sir: The following report is respectfully submitted.

As the land designated for the experimental plats could not be cleared in time to begin operations on said land during 1891, some worn fields were used as a temporary site for plat experiments.

In accordance with instructions, not a great many field tests were carried on during the past season. The results of a few of these appear in Bulletin No. 4. Other work, designated by the Board and necessary in preparing for experimental purposes a farm which had for years been in the hands of negro tenants, required a large part of my time.

During the year permanent Bermuda meadows have been prepared by plowing and leveling the uneven sod on the bottom land. These are now ready for any experimental treatment which may seem desirable.

German millet, oats, sorghum, eight varieties of corn, sorghum and corn for ensilage, have also been grown on the bottom land.

Early in the spring of 1891 nearly four acres of land were prepared for a garden. Stumps were dug, rocks removed, terrace lines run, and the land manured. On this were grown fair crops of several varieties of turnips, cabbage, collards, okra, beans, tomatoes, corn, onions and Irish potatoes.

Oats, peas, and sweet potatoes constituted the most important crops grown on the uplands. Here, on plats, one-tenth and one-twentieth acre each, were made a number of fertilizer tests on oats.

During November and December, 1891, plats for a portion of the next season's work with grain have been surveyed and marked with iron stakes,—sections of gaspipe. Up to December 31, 1891, eighty-two such plats had been sown in wheat and oats, testing varieties, fertilizers, etc.

Among the questions on which it is hoped these tests may throw some light, are the following:

(1) What is the earliest, hardiest and most prolific wheat for this section? (2) What is the relative yield of Red Rust Proof oats from seed grown in Texas and in South Carolina and from seed grown on fields of different fertility? (3) What is the relative or exchange value of cotton seed and cotton seed meal as a fertilizer for grain?

(4) What fertilizer applied to wheat and oats at sowing gives greatest profit, and which affords best return when applied in the spring? (5) In what proportion and amounts do cotton seed meal, dissolved bone, and nitrate of soda give greatest profit?

The new land cleared for experimental purposes consists of nearly ten acres. From this brush and all stumps, except the largest, have been removed. Most of the large stumps have been shattered or cracked with blasting powder.

A pasture of fifty or sixty acres has been inclosed by wire fence. The cow barn, erected during the summer, can accommodate 100 head of cattle. It has ample loft room, harness and feed rooms, etc. Under the same roof are six silos, four framed with vertical studding, two with horizontal girts. One of these, estimated as holding 60 tons, is filled with sorghum. Another of equal capacity is full of corn ensilage.

Last spring an outfit of farm implements was purchased and from time to time other implements have been added.

Respectfully submitted,

J. F. DUGGAR,

Assistant Director.

Treasurer's Report, South Carolina Experiment Station.

DR.

To appropriation for the year ending June 30,
1891, under Act of Congress, approved
March 2, 1887\$15,000 00

1891.	CR.	
June 30. By Salaries	\$	5,291 15
By Labor		957 03
By Supplies		687 82
By Freight and Express		169 45
By Postage and Stationery		30 77
By Printing		1,434 80
By Library		57 71
By Tools and Implements		1,000 13
By Scientific Instruments and Chemical Apparatus		1,345 32
By Furniture		5 00
By Buildings		750 00
By Fences and Drainage		168 32
By Live Stock		2,391 50
By Traveling Expenses		209 25
By Incidental Expenses		43 90
By Excess of Expenditures over receipts brought over from last report of June 30, 1890, for fiscal year ending June 30, 1890		457 85
TOTAL	\$	<u>15,000 00</u>

P. H. E. SLOAN,
Treasurer.

FORT HILL, S. C., DEC. 15, 1891.

The Committee appointed by the Board of Trustees of Clemson Agricultural College to examine and audit the accounts and vouchers of the Treasurer, so far as they relate to the expenditures of the Experiment Station for year ending 30th June, 1891, beg leave to report that they have carefully examined the books, accounts and bills of the Treasurer, and find that the same are correct, and that the expenditures are sustained by proper vouchers.

JAS. L. ORR,
R. E. BOWEN,
Committee.

DEC. 15th, 1891.

I hereby certify that the foregoing Statement of account, to which this is attached, is a true copy from the books of account of the Institution named.

P. H. E. SLOAN,
Treasurer.

I hereby certify that the signatures as above are genuine, and that the persons signing have been duly authorized by the Board of Trustees as Auditing Committee and Treasurer.

R. W. SIMPSON,
President Board of Trustees Clemson Agricultural College.

SOME ACTS

Of the Congress of United States and the General Assembly of South Carolina, bearing upon the establishment of the South Carolina Experiment Station, which is the Agricultural Station of Clemson College.

In March, 1887 Congress passed the "Hatch" Act making provision for the establishment of experimental stations in all the States and Territories, as follows:

"AN ACT TO ESTABLISH AGRICULTURAL EXPERIMENT STATIONS IN CONNECTION WITH THE COLLEGES ESTABLISHED IN THE SEVERAL STATES UNDER THE PROVISIONS OF AN ACT APPROVED JULY 2, 1862, AND OF THE ACTS SUPPLEMENTARY THERETO.

SECTION 1. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges, or agricultural department of colleges, in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an Act approved July 2, 1862, entitled 'An Act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts,' or any of the supplements to said Act, a department to be known and designated as an 'Agricultural Experiment Station:' *Provided*, That in any State or Territory in which two such colleges have been or may be so established, the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the Legislature of such State or Territory shall otherwise direct.

"SEC. 2. That it shall be the object and duty of said Experiment Stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantage of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United

States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

"SEC. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said Stations, it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigations or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this Act. It shall be the duty of each of said Stations, annually, on or before the first day of February, to make to the Governor of the State or Territory in which it is located, a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said Stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

"SEC. 4. That bulletins or reports of progress shall be published at said Stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the Station will permit. Such bulletins or reports, and the annual reports of said Stations, shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster General may from time to time prescribe.

"SEC. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of \$15,000 is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of Section Eight of this Act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments on the first day of January, April, July, and October in each year, to the Treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, 1887; *Provided, however*, That out of the first annual appropriation so received by any Station an amount not exceeding one-fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such Station; and thereafter an amount not exceeding 5 per centum of such annual appropriation may be so expended.

"SEC. 6. That whenever it shall appear to the Secretary of the Treasury, from the annual statement of receipts and expenditures of any of said Stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such Station, in order that the

amount of money appropriated to any Station shall not exceed the amount actually and necessarily required for its maintenance and support.

"SEC. 7. That nothing in this Act shall be construed to impair or modify the legal relation existing between any of the said colleges and the Government of the States or Territories in which they are respectively located.

"SEC. 8. That in States having colleges entitled under this Section to the benefits of this Act, and having also Agricultural Experiment Stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established, by such States; and in case any State shall have established, under the provisions of said Act of July 2 aforesaid, an Agricultural Department or Experiment Station in connection with any university, college or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate Agricultural College or school, which shall have connected therewith an Experimental Farm or Station, the Legislature of such State may apply in whole or in part the appropriation by this Act made, to such separate Agricultural College or school; and no Legislature shall, by contract, express or implied, disable itself from so doing.

"SEC. 9. That the grants of moneys authorized by this Act are made subject to the legislative assent of the several States and Territories to the purpose of said grants: *Provided*, That payments of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its Legislature meeting next after the passage of this Act shall be made upon the assent of the Governor thereof duly certified to the Secretary of the Treasury.

"SEC. 10. Nothing in this Act shall be held or construed as bind the United States to continue any payments from the Treasury to any or all the States or institutions mentioned in the Act, but Congress may at any time amend, suspend, or repeal any or all of the provisions of this Act."

In December, 1887, the General Assembly passed the following Act, accepting the grant of \$15,000 to South Carolina.

"Be it Further enacted, That the assent of the Legislature of the State of South Carolina to the purposes of the grant of fifteen thousand dollars to each of the States and Territories by the Congress of the United States, according to the terms of an Act to establish Agricultural Experiment Stations in connection with the colleges established in the several States under the provisions of an Act approved July second, eighteen hundred and sixty-two, and of the Acts supplementary thereto, approved March 2d, 1887, is hereby expressly declared, and the



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grant is accepted according to the terms of said Act. And it is further enacted, That the grant under the provisions of said Act of 1887 is hereby vested, until the further action of the General Assembly, in the Trustees of the University of the State of South Carolina; and an 'Agricultural Experiment Station' shall be established in connection with and under the direction of said college, to be supported by said grant, according to the provisions of said Act."

In 1889, the General Assembly passed an Act establishing the Clemson Agricultural College at Fort Hill, near Pendleton, S. C,

SEC. 2 of this Act reads as follows :

"That the annual grant of fifteen thousand dollars, commonly known as the Hatch Bill Fund, made to the State of South Carolina by the Congress of the United States, according to the terms of an Act of Congress entitled 'An Act to establish Agricultural Experiment Stations in connection with the colleges established in the several States under the provisions of an Act approved July second, eighteen hundred and sixty-two, and of the Acts supplementary thereto,' approved March 2d, 1887, be, and the same shall be, on, or as soon after the first of November, 1890, as this Act shall take effect, withdrawn from the control of the Board of Trustees of the University of South Carolina, in whom it was vested by an Act entitled 'An Act to amend Chapter XX, of the General Statutes, entitled "Of the University of South Carolina," approved Dec 22d, 1887.' And the said grant of fifteen thousand dollars is hereby vested in the six members of the Board of Trustees of Clemson Agricultural College of South Carolina, chosen by the General Assembly; and an Agricultural Experiment Station shall be established in connection with the said Agricultural College, and under the direction of the Board of Trustees thereof, to be supported by the said grant according to the provision of the Act of Congress hereinbefore mentioned."